

HEP Facilities

Fred Gilman

HEPAP Meeting

LBL

March 6, 2003

Charge to HEPAP

- A process is underway within the Office of Science to produce a Strategic Plan, including a twenty-year roadmap of the facilities that could be undertaken as an integral part of the scientific vision to be articulated in the plan. This Strategic Plan has strong analogies to the plan for particle physics in the LRP Subpanel report.
- Ray Orbach sent a charge letter in December to each of the six science advisory committees to the Office of Science, asking them to review a list of facilities in their area of science.

December 18, 2002

Professor Frederick Gilman
Department of Physics
Carnegie Mellon University
Pittsburgh, PA 15213

Dear Professor Gilman:

For more than a half-century the Department of Energy's Office of Science has envisioned, designed, constructed and operated many of the premiere scientific research facilities in the world. More than 17,000 researchers and their students from universities, other government agencies, private industry and from abroad use Office of Science facilities each year—and this number is growing.

Creating these facilities for the benefit of science is at the core of our mission and is part of our unique contribution to our Nation's scientific strength. It is important that we continue to do what we do best: build facilities that create institutional capacity for strengthening multidisciplinary science, provide world class research tools that attract the best minds, create new capabilities for exploring the frontiers of the natural and physical sciences, and stimulate scientific discovery through computer simulation of complex systems.

To this end, I am asking all the Office of Science's advisory committees to join me in taking a new look at our scientific horizon, and to discuss with me what new or upgraded facilities will best serve our purposes over a timeframe of the next twenty years. More specifically, I charge the committees to establish a subcommittee to:

A. Consider what new or upgraded facilities in your discipline will be necessary to position the Office of High Energy Physics at the forefront of scientific discovery. Please start by reviewing the attached list of facilities, assembled by Dr. Peter Rosen and his team, subtracting or adding as you feel appropriate, with prudence as to cost and timeframe. For this exercise please consider only facilities/upgrades requiring a minimum investment of \$50 million.

A. B. Provide me with a report that discusses each of these facilities in terms of two criteria:

1. 1. The *importance of the science* that the facility would support. Please consider, for example: the extent to which the proposed facility would answer the most important scientific questions; whether there are other ways or other facilities that would be able to answer these questions; whether the facility would contribute to many or few areas of research; whether construction of the facility will create new synergies within a field or among fields of research; and what level of demand exists within the scientific community for the facility. In your report please categorize the facilities in three tiers, such as “absolutely central,” “important,” and “don’t know enough yet,” according to the potential importance of their contribution. Please do not rank order the facilities.
2. 2. The *readiness* of the facility for construction. Please think about questions such as: whether the concept of the facility has been formally studied in any way; the level of confidence that the technical challenges involved in building the facility can be met; the sufficiency of R&D performed to-date to assure technical feasibility of the facility; and the extent to which the cost to build and operate the facility is understood. Group the facilities into three tiers according to their readiness, using categories such as “ready to initiate construction,” “significant scientific/engineering challenges to resolve before initiating construction,” and “mission and technical requirements not yet fully defined.”

Many additional criteria, such as expected funding levels, are important when considering a possible portfolio of future facilities, however for the moment I ask that you focus your thoughts on the two criteria discussed above.

I look forward to hearing your findings and discussing these with you in the future. I would appreciate at least a preliminary report by March, 2003.

Sincerely,

Dr. Raymond L. Orbach
Director
Office of Science

Charge to HEPAP (continued)

- The charge letter from Orbach was accompanied by brief descriptions of 13 HEP facilities. These were essentially the DOE projects that are found in “A Roadmap for Particle Physics, Appendix A of the LRP Subpanel report, and are not already under construction or in operation.

Responding to the Charge

- Maintaining and updating the roadmap is an essential part of the general charge to P5; it needed to be involved in the response to Orbach.
- Although P5 and HEPAP would have carried out a detailed examination of the roadmap at a later date, Orbach's charge put it on the front burner, with a response requested by March.
- The HEP Facilities Committee was formed, consisting of members of P5, plus seven others, mostly from HEPAP, including me as chair.

HEP Facilities Committee

Jonathan Bagger

Eugene Beier

Pat Burchat

Gerry Dugan

Gary Feldman

Fred Gilman (chair)

Dan Green

Marc Kamionkowski

Boris Kayser

Young-Kee Kim

Bill Marciano

Jay Marx

Rene Ong

Ritchie Patterson

Charles Prescott

Tor Raubenheimer

Randal Ruchti

Abe Seiden

Marjorie Shapiro

Mel Shochet

Elizabeth Simmons

Stan Wojcicki

Responding to the Charge (con't)

- Written narratives were requested on each of the facilities on a somewhat revised list from proponents/laboratories
- The Committee met on February 15-16 in Pittsburgh to hear brief presentations, hear answers to previously emailed questions, and discuss additional issues with the presenters.
- The Committee began preparing a draft response to Orbach on February 16th, and has been iterating drafts by email.

Agenda

HEP Facilities Committee Meeting

Saturday, February 15, 2003

(HEP Facilities Committee plus Presenters and Others)

8:30 am	Welcome and Introduction	Fred Gilman
8:45 am	SNAP	Saul Perlmutter
8:55 am	Questions and Discussion	
9:15 am	Linear Collider	Tor Raubenheimer
9:25 am	Questions and Discussion	
9:45 am	LHC Upgrades	David Lissauer
9:55 am	Questions and Discussion	
10:15 am	BREAK	
10:30 am	BTeV	Sheldon Stone
10:40 am	Questions and Discussion	
11:00 am	Super B Factory	Dave Hitlin
11:10 am	Questions and Discussion	
11:30 am	CKM	Peter Cooper
11:40 am	Questions and Discussion	
12:00 pm	LUNCH BREAK	

Agenda of HEP Facilities Committee Meeting(con't)

1:30 pm	Double-Beta Decay Detector	Peter Rowson
1:40 pm	Questions and Discussion	
2:00 pm	Proton Decay Detector	Chang Kee Jung
2:10 pm	Questions and Discussion	
2:30 pm	BNL Super Beam	Tom Kirk
2:40 pm	Questions and Discussion	
3:00 pm	BREAK	
3:15 pm	Off-Axis Neutrino	Adam Para
3:25 pm	Questions and Discussion	
3:45 pm	FNAL Super Beam	Debbie Harris
3:55 pm	Questions and Discussion	
4:15 pm	Neutrino Factory	Steve Geer
4:25 pm	Questions and Discussion	
4:45 pm	Discussion	
5:30 pm	Adjourn	

Agenda of HEP Facilities Committee Meeting (con't)

Sunday, February 16, 2003

(Only HEP Facilities Committee)

9:00 am

Review and Discussion

10:30 am

BREAK

10:45 am

Structure of the Report

12:00 pm

LUNCH BREAK

1:00 pm

Writing Assignments Schedule

2:00 pm

Adjourn

HEP Facilities List

Linear Collider

LHC Luminosity Upgrade

LHC Energy Upgrade

SNAP

BTEV

CKM

Super B-Factory

Double-Beta Decay Detector (Liquid Xenon)

Off-Axis Neutrino Detector

Neutrino Super Beam (2 narratives)

Next-Generation Underground Detector (2 narratives)

Neutrino Factory

Criteria to be Applied

- Scientific Importance (as in Orbach's letter)
 - “absolutely central”
 - “important”
 - “don't know enough yet”
- Readiness
 - “R&D phase”
 - “ready for project engineering and design”
 - “ready for a decision on construction”

Form of the Response

- A Cover Letter, with a discussion of the overall context provided by the twenty-year plan for particle physics in the Subpanel report and a summary discussing each of the facilities, including the scientific importance and readiness criteria requested in Orbach's charge letter.
- One-pagers on each of the facilities
- A summary table